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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants: KING et al.

Group Art Unit: 1714

Serial No.: 09/631,412

Examiner: C. Shosho

Filed: August 3, 2000

Date: May 29, 2003

For: INK JET PRINTING METHOD

Commissioner for Patents
PO Box 1450
Alexandria, Virginia 22313-1450

OK to
enter

C.L.
6/19/03

DECLARATION OF JEFFREY RONALD KING UNDER 37 CFR 1.132

Sir:

JEFFREY RONALD KING hereby declares and says:

1. I am one of the named joint inventors of U.S. Patent Application Serial Number 09/631,412, which was filed on August 3, 2000 and assigned to ILFORD Imaging UK Limited and ILFORD Imaging Switzerland GmbH ("the Application"). The other named inventors are Karen Taylor, Simon Richard John Leggett, Stefan Schüttel, and Meinrad Schaer.

2. I have been employed by ILFORD Imaging UK Limited and its predecessors for 33 years. For the past five years I have held the position of Product Development Scientist, in the area of recording materials for ink jet printing.

3. I am familiar with the contents of the application, the Office Action dated August 3, 2001, the Amendment submitted on February 4, 2002, the Office Action dated July 19, 2002, the Amendment submitted on November 5, 2002, the Office Action dated February 4, 2003 and the Amendment concurrently submitted with this Declaration. I submit this

declaration on behalf of myself and the other inventors in support of the patentability of all pending claims.

4. All claims pending in the application, namely 17-30, stand rejected under 35 USC 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter of the invention. Specifically, the Examiner asserts that the phrase "substantially retained within the upper protective layer" as recited in claim 17 is unclear.¹ I respectfully disagree with the Examiner's position and believe that this phrase is clear to one of ordinary skill in the art from the description and drawings of the Application.

5. I was primarily responsible for the work that is described in the Examples of the Application which supports our position. As described in the Specification of the Application, the purpose of the research that led to the present invention was to develop a receiving medium and printing method to produce robust images that are scratch and rub resistant. As a result of numerous experiments, including those described in the Examples, it was determined that the proposed medium should have the following properties.

6. First, the ink should be completely absorbed into the surface of the material, as any colorant left on the surface of the medium after sealing will tend to rub off or bleed when wetted.

¹ Claims 17 through 30 are currently pending in the Application and independent claim 17 states as follows:

An ink jet printing method comprising the steps of:

- 1) printing on to a receiving medium which comprises a substrate coated with at least one ink receiving layer and at least one upper protective layer which comprises polymeric particles having film forming temperatures between 60 to 140 °C and a binder; and
- 2) heating the printed image to form a stable image-protecting coating; wherein said printed image is substantially retained within the upper protective layer.

7. Second, and within the constraints of the point made in paragraph 6, the colorant should be kept as close to the surface of the material as possible to maximize colour gamut.

8. Third, a lower layer, referred to in the Application as the ink receiving layer, is essential for use in ink jet printing in retaining the liquid component of the ink and separating it from the colorant.

9. Last, the optimum coating weight of each layer depends on a number of factors; the most crucial factor being that the upper protective layer should be as thin as possible to retain the colorant near the surface, but sufficiently thick to absorb "substantially all" of the colorant, and also thick enough to form a continuous protective layer after sealing the print. The most important factor determining the preferred thickness of the upper protective layer is the maximum quantity of ink to be printed.

10. Consequently, in designing the medium of the present invention, it was determined that testing should be performed under extremely severe conditions. This involved printing a patch with a 100% load of yellow, magenta, and cyan inks, i.e. a total ink load of 300%. This is expected to be as least as great an ink load as anything likely to be encountered in commercial use. The experiment is the subject of Example 3 of the Application.

11. After printing was complete, the position of the colorant within the printed and sealed image was determined by cutting thin sections of the imaged medium using an instrument called a microtome with a glass knife. These transverse sections were mounted on glass slides and viewed under high magnification using optical microscopy. A permanent

record of the microscope image as a black and white photographic print was made. A copy of which is seen in Figure 1 of the Application.

12. Figure 1 of the Application illustrates the print of the transverse microscopic section. Substrate (3) and the two main layers, namely, upper protective layer (1) and the ink receiving layer (2), can clearly be distinguished by their respective visual appearances. The interface between layers (2) and (1) is somewhat irregular because the surface of layer (2) is rough due to the relatively large particles of inorganic filler which make up ink receiving layer (2). The position of the colorant can also be distinguished; it is clearly retained within the upper protective layer (1) which appears black, whereas the lower ink receiving layer (2) is colourless, showing that essentially none of the image has broken through to ink receiving layer (2) and the ink has been "substantially retained within the upper layer."


13. This is more readily observed through the microscope or on a color print than on Figure 1 of the Application, which is only a black and white photocopy. The enclosed color print shows a section of a printed material produced in the same manner as described in Example 3 of the Application. A black image was produced by laying yellow, magenta, and cyan inks down in sequence when the image is printed, as described in Example 3 of the Application (the printer actually lays the cyan ink down first and the yellow ink last). Colorant left on the surface of the medium would appear as a yellow or brown fringe on the surface of the section, and colorant breaking through to the lower ink receiving layer would appear as a cyan stain in this layer. Visual inspection of the image of the section shows that the colorant is substantially located in the upper protective layer (1), i.e., a dense image is observed in the upper layer, with no observable residual colorant on the surface, and no

observable color in the ink receiving layer (2). The section also shows the cyan colorant towards the bottom of the top layer, confirming that it was laid down first.

14. Therefore, in my opinion, the meaning of the term "substantially retained within the upper protective layer," as used in the Application is readily determined by visual inspection of a transverse section of the image under a microscope. "Substantially retained" refers to no residual colorant on the surface and no significant breakthrough of the colorant onto the lower ink receiving layer, even at high ink loads. It is my opinion that one of ordinary skill in the art would understand what is meant by "substantially retained" within the upper protective layer.

I declare that all statements herein made of my own knowledge are true and that all statements made upon information and belief are believed to be true, and that I am aware that willful false statements and the like are punishable by fine or imprisonment, or both, under 18 U.S.C. 1001, and may jeopardize the validity of the application or any patent issuing therefrom.

Dated: May 29, 2003


JEFFREY RONALD KING
ILFORD IMAGING UK LIMITED